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United States Department of Agriculture,

BUREAU OF FORESTRY.—Circular No. 24.

A NEW METHOD OF TURPENTINE ORCHARDING.

The Bureau of Forestry will shortly issue a bulletin describing a new method of working Southern pines for turpentine. This method is intended to replace the present wasteful and injurious system of boxing. As the bulletin can not be published in time to reach turpentine operators before the present season's work begins, this circular is issued in advance for the purpose of giving operators an opportunity to install the new system, and thus avoid the loss in quantity and quality of products consequent upon another year of work with the old system of boxing.

The forthcoming bulletin will deal with the turpentine industry in general and with the economies that the new system makes possible. Here brief mention only can be made of the principal features of the system. Important among these is the production of 23 per cent more turpentine than by boxing and the yield of only the higher grades of rosin. The cost of the new equipment can easily be paid for from the extra returns of the first season, and there will also be an additional margin of profit. Moreover, since there is no box cutting under the new system, the least possible damage is done the trees; shallow chipping only is necessary.

For the season of 1902 the production of spirits of turpentine by the old system of boxing amounted to 600,000 barrels, valued at \$13,200,000. The production of rosin was 2,100,000 barrels, valued at \$4,200,000. The total value of the crop was thus \$17,400,000. Had the new method been applied to the same area of timber, the production of spirits of turpentine would have been 1,050,000 barrels, amounting in value to \$23,100,000. The production of rosin would have been 4,675,000 barrels, worth at current prices \$7,350,000. The total value of this product would have been \$30,450,000. This increased yield by the new system represents a net loss to the Southern naval stores industry of \$13,000,000 from boxing in one season.

It is important to note here also that the ordinary labor used for all boxing operations readily adapts itself without extra cost or training to the working of the new system.

This system was devised by Dr. Charles H. Herty, Expert in the Bureau of Forestry, and under his supervision received a thoroughly practi-

cal test at Ocilla, Ga., during the season of 1902. Its essential features are as follows:

1. An earthen cup of the same capacity as the standard box is used to catch the crude turpentine. At the top of the cup there is a stout rim, with a half-inch hole, by which the cup is suspended from a nail driven into the tree (fig. 1).

2. Two thin galvanized sheet-iron gutters convey the resin into the cup. These gutters are each 2 inches wide and from 6 to 12 inches

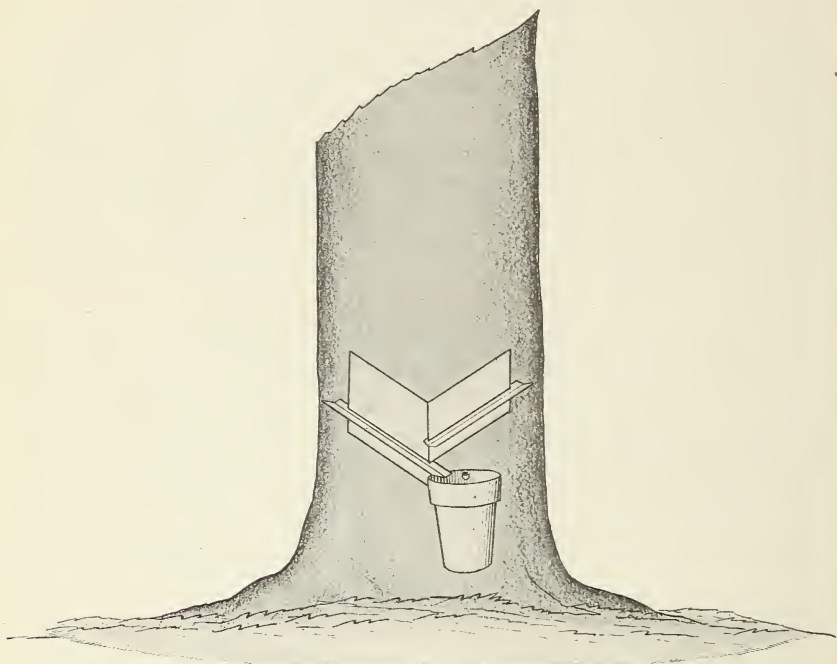


FIG. 1.—Showing the position of cup and gutters.

long, and are bent lengthwise through the middle at an angle of about 120° , thus forming an angled trough (fig. 3).

INSTALLING THE EQUIPMENT.

This system can be applied to trees previously boxed as well as to unboxed timber. In placing the equipment on unboxed timber, two flat faces are provided by means of cornering axes, a right-handed and a left-handed man working together. The first strokes with the axe are the same as in cornering the box. Next, by upward strokes of the ax, enough of the bark and sapwood is removed to form flat faces one-half as high as the distance between their outer edges. In this way the two men prepare a double face, corresponding in width with that of the box which would have been cut in such a tree.

Two inclined converging incisions are then made, one across each flat face, for the reception of the two sheet-iron gutters. The incisions are made by a right-handed and a left-handed workman, each with a broad-ax, having a straight-edged blade 12 inches wide. The men work on opposite sides of the tree; each man directs the head of his broadax somewhat downward, and with one stroke makes an inclined gash about one-fourth of an inch deep, across the flat face on his side of the tree. The incisions are made slightly deeper at their lower ends. The gash on one side should be made about an inch lower than on the other, but both should be so placed that there will be a space about 3 inches wide above them for the passage of the hack in the later chipping of the faces. Into the incisions thus made the galvanized iron gutters are firmly inserted, either by pressing one edge upward into the cut, or, better, by slipping the gutter endwise into the upper end of the cut and pushing it downward into place (fig. 1). The lower end of the upper gutter is brought to, and then forced down one-fourth of an inch beyond, the angle where the two faces meet; while the inner end of the lower gutter should pass beyond the angle about one and one-half inches, thus forming a spout to convey the resin from both gutters into the cup below (fig. 1).

In hanging the cup, care should be taken to drive the nail (a common 6-penny wire nail) at a sharp downward incline, and deep enough to leave only about three-fourths of an inch exposed. The nail is driven on the same side of the tree with the upper gutter, so that the cup when hung shall not be more than half an inch below the end of the spout of the lower gutter, and the nail shall be as far as possible from the dripping resin. This point is of great importance, for when the cups are filled with rain water, the fresh resin, lighter than water, at first forms a floating disc on the surface. As more resin drops on this, the disc enlarges until it touches and becomes anchored to the wall of the cup. If the cup is properly placed, this point of contact will be well away from the nail-hole, which will consequently not be clogged by the resin. As more resin drops upon this floating disc, the growing weight will shift the center of gravity and cause the viscous mass to sink lower along the side of the cup nearest the spout; at the same time, the water level will rise until the nail-hole permits an overflow. Thus each fresh drop of resin will force out a drop of water, while as the water does not rise to the top of the cup no resin is floated over the edge. After the streak has practically ceased running, the water above prevents the resin in the cup from losing its spirits of turpentine by evaporation.

Where the equipment is to be placed on trees which have previously been worked under the box system, it is unnecessary to provide the flat faces described, as the surface left by the chipping of the previous season answers the same purpose. One of the chief advantages of the new method is that the cup and gutters are placed each season immediately below the streak, thereby insuring a yield greater in quantity and

of better quality than is possible where the resin must flow over a long dry face to reach the box. On the higher faces the workmen with the broadaxes change sides, the blow being then delivered by an over-hand stroke.

The installation, in detail, is as follows:

On virgin, or unboxed, timber.—Three pairs of workmen (right-and-left-handed), with cornering axes, lead the squad, cutting the flat faces for the gutters. These are followed by a right-handed and a left-handed laborer, who make the incisions with broadaxes for the gutters. These eight men work back and forth across the drift in narrow lines and are

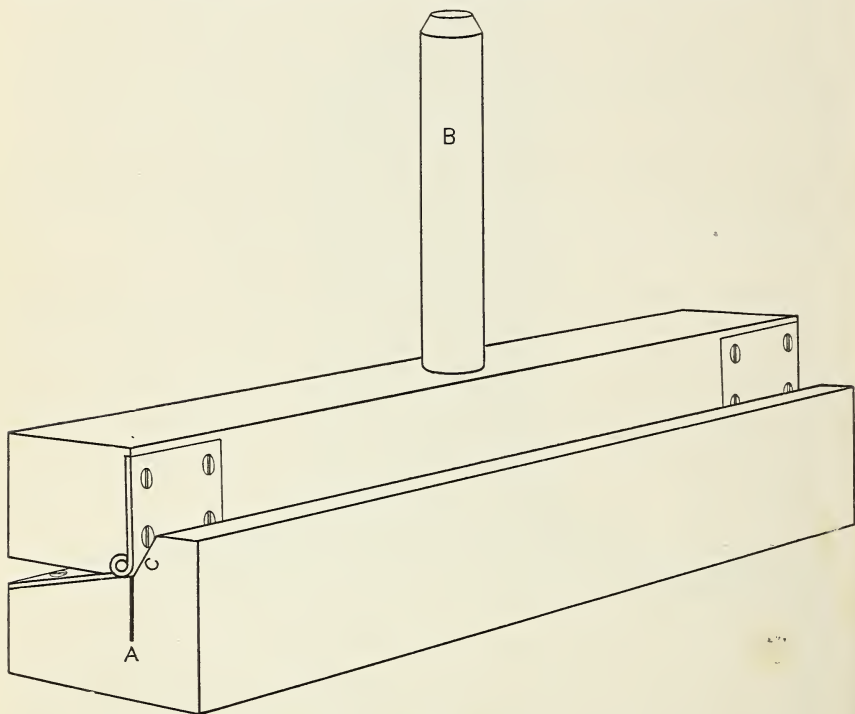


FIG. 2.—A device for bending gutters (one-third actual size).

followed by eight others, who quickly insert the gutters before the incisions begin to close, drive the nails, and hang the cups. In order that no time be lost, the cups should be distributed to each tree by a boy following closely after the axmen. In making the incisions with the broadax, care should be taken that the head of the ax is turned down only slightly, otherwise the inner half of the gutter may have too much slope, and upon the formation of the scrape in it the resin from a fresh chipping will run over the outer edge and be wasted. Two men are usually able to cut about 3,000 faces per day.

Two inspectors, one for the ax work and one for the gutter work, are

required. Tallying the faces is unnecessary, as an accurate record of these can be kept from the number of crates of cups used.

On boxed timber.—The six laborers with the cornering axes are unnecessary in applying this system to boxed timber, as the chipping of the previous season furnishes the flat faces required. The remainder of the work is therefore the same as on virgin, or unboxed, timber.

Whether the cup system is applied to virgin or to boxed timber, the best labor available should be assigned to the axes. If that work is well done, there will be no difficulty with the rest.

SPECIFICATIONS OF THE EQUIPMENT.

The following descriptions give in detail the essential features of the cups and gutters required by the new system.

CUPS.

The cups used are of clay, and are similar to flower pots. The form recommended is shown in fig. 1, and has the following dimensions:

	Inches.
Top ----- diameter inside ..	5½
Bottom ----- do -----	3½
Depth -----	7
Rim ----- deep -----	2

The bottom should be oval inside and flat outside, and the side walls one-fourth of an inch thick. A nail hole half an inch in diameter should be placed half an inch from the top of the rim. This cup has the same capacity as the standard box.

GUTTERS.

On account of the variable size of trees, and consequently of the width of the faces, it is best to purchase the gutter iron in long strips 2 inches wide, which can be subsequently cut into the desired lengths. For this purpose a pair of No. 8 tinner's snips can be used, but care should be taken to avoid turning the corner of the iron where the cut is first made. One thousand and eighty-six pounds of No. 29, or 2,050 pounds of No. 28, gage galvanized sheet iron will furnish gutters for one crop of 10,500 cups. The gutters commonly needed range from 6 to 12 inches long. After the iron is cut to the proper lengths, it is necessary to bend each piece to an angle of about 120° along its full length (fig. 3). No expensive apparatus is needed for this bending; a simple wooden machine (fig. 2) costing about 50 cents to make is sufficient. In operating this device, the flat piece of gutter iron is dropped into the narrow slit (A) and the handle (B) is pulled forward until the motion is stopped by the beveled edge (C). The bent gutter is then removed. A few minutes' practice enables a boy to bend from twenty to twenty-five gutters per minute.

Gutter boxes.—The gutters (6 to 12 inches long) are carried by the guttermen in boxes made with sloping sides and partitioned for the different lengths.

Placing the gutters.—The following precautions should be carefully observed in placing the gutters:

(1) The gutter must pass into the wood throughout the whole width of the face; otherwise there will be a leakage of resin behind it.

(2) The upper and lower gutters must be at least 1 inch apart at their inner ends on the angle of the faces so that there shall be no choking by the accumulated scrape.

(3) The inner end of the upper gutter should come to the angle at the middle of the faces and project not more than one-quarter of an inch beyond it.

(4) It is absolutely essential to the successful working of the apparatus that the lower gutter form a spout by extending about $1\frac{1}{2}$ inches beyond the angle at the middle of the faces.

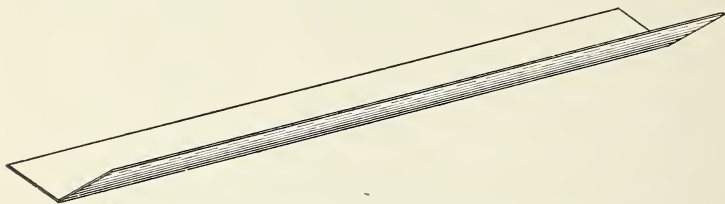


FIG. 3.—Showing form of gutter (one-third actual size).

(5) Both gutters must be pushed deep into the wood at the angle of the faces.

TOOLS.

Cornering ax.—This ax, common on all turpentine places, is the best tool for cutting the flat faces for the gutters on virgin timber.

Broadax.—Two broadaxes with blades 12 inches wide with straight edges are to be set on short straight handles, one for a right-handed and one for a left-handed man.

On virgin timber a stock broadax, single-beveled, is used. On boxed timber a double-beveled broadax is preferable.

Claw hatchet.—This is the only tool required by the guttermen. It may be used in driving the gutter in case it sticks in the incisions, and answers also for driving the nails upon which the cups are hung and for the removal of bark, etc., in order to hang the cups properly.

OPERATING WITH THE EQUIPMENT.

Chipping.—This operation is precisely the same as in boxed timber. The upper gutter is placed about 3 inches below the chipping surface, thus giving abundant space for the passage of the hack.

Pulling.—Here again no change whatever is made in the usual prac-

tice on boxed timber; the puller passes easily between the gutter and the streak.

Dipping.—The tool used for dipping the cups is a steel blade 8 inches long, 2 inches wide at the lower end, and 4 inches at the upper end. This may be made from an old saw and fastened to a wooden handle extending a little over the upper end of the blade. Where the cups have oval bottoms, the lower end of the dipping knife should be rounded to fit them.

In dipping, the accumulated scrape is first loosened from the gutters by means of this dipping knife and pushed down into the cup. The cup is then removed from the nail and the resin is cut from the walls by a circular movement of the knife and emptied into the bucket.

Cost of equipment for one crop.

Cups (10,500) at 1½ cents each	\$131.25
Gutter strips (1886 pounds galvanized iron, No. 29 gage, cut in 2-inch widths)	103.27
Cutting and shaping gutters	4.00
Nails (6-penny wire)	1.05
Freight charges (estimated)	30.00
Labor at trees	80.00
Total	<u>\$349.57</u>

The prices given are those at which responsible firms will at present furnish the material required. If the cups be placed on boxed timber the item of labor may be reduced to \$30, as the chipping of the previous season furnishes, without further labor, the flat surfaces for the gutters, which slide more readily into the incisions on old faces than into those on freshly exposed sapwood. The estimated freight charges are based upon a material reduction in freight rates recently offered by the principal railroads in the turpentine belt.^a

^aThe following railroads have agreed to haul the equipment as Class P matter in carload lots, 24,000 pounds minimum carload:

Atlantic Coast Line Railroad Company,
Central of Georgia Railway Company,
Georgia Railroad,
Georgia, Florida, and Alabama Railway Company,
Georgia, Southern, and Florida Railway Company,
Macon and Birmingham Railway Company,
Seaboard Airline Railway,
Southern Railway Company,
Western and Atlantic Railroad,
Wrightsville and Tennille Railroad Company.

This rate became effective on November 10, 1902.

ASSISTANCE IN THE FIELD.

In addition to the instructions here given, the Bureau of Forestry offers to all operators without charge the assistance of Dr. Charles H. Herty, who will personally direct in the field the installment of the new method. Applications for assistance should be directed to the Forester, Bureau of Forestry, U. S. Department of Agriculture, Washington, D. C.

GIFFORD PINCHOT,
Forester.

Approved:
JAMES WILSON,
Secretary.

WASHINGTON, D. C., *February 2, 1903.*

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FORESTRY AND THE LUMBER SUPPLY.

FORESTRY AND FORESTERS.

By THEODORE ROOSEVELT.

THE EXHAUSTION OF THE LUMBER SUPPLY.

By R. L. McCORMICK.

THE LUMBERMAN AND THE FORESTER.

By GIFFORD PINCHOT.
